Is retention on ART underestimated due to patient transfers? Estimating system-wide retention using a national labs database in South Africa

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on behalf of

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Background

- **Systematic reviews have shown high rates of attrition in patients receiving antiretroviral therapy**
  - 36 months retention averages 65%–70% (Fox JAIDS 2015)
  - Attrition includes both death and loss to follow up
- **Clinic perspective is limited:**
  - Some patients who request transfer don't appear at a new clinic
  - Some lost patients return but are counted as new patients (cycling)
  - Some patients lost re-enter care at another clinic (silent transfer)
- **Migration, transfers, silent transfers and cycling may lead to under-estimation of retention in care**

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Objective

- **To use a new national HIV patient cohort in South Africa created from South Africa's national laboratory database (National NHLS HIV Cohort), that can identify movement between clinics to assess system-wide retention in care within the public sector**
  - We compared system-wide retention to retention at the initiating clinic to explore the impact of transfer to new sites
  - We assessed demographic predictors of system-wide retention in care
  - Used anonymized data, and work was approved by NHLS, HREC (Wits) and IRB (Boston University)

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Methods

- **The National Health Laboratory Services (NHLS) National HIV cohort**
  - NHLS is the main provider of laboratory services for the public-sector program in South Africa
  - Cohort created using all routine CD4/Viral Loads done since 2004
- **A validated unique patient identifier**
  - Exact match on first, last name, DOB, sex, facility
  - Identify candidate matches for probabilistic record linkage
  - Score candidate matches based on similarity (Fellegi-Sunter, 1969)
  - Use graph-based approaches to guide decisions about whether a pair are a match
  - 94% Sensitivity, 99% Positive Predictive Value compared to manually-matched gold standard

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Methods

- **Included all patients starting ART between Apr 2004 – Dec 2006 with any follow up**
  - By guidelines, first viral load was collected at ART initiation
- **Assessed retention as *time to a patient's most recent lab result* (CD4/VL)**
  - Followed patients through December 2014
  - "Retained in care" at ~6 years, if their last lab occurred December 2012- December 2014
- **Assessed two retention concepts:**
  - (a) *system-wide retention* including all labs regardless of facility
  - (b) *retention at initiating clinic,* ignoring labs at other facilities
  - Both definitions reflect attrition from death and loss to follow up

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Results

NHLS National HIV Cohort

- **11.6 million people have ever sought care for HIV**
- **About 40% are single CD4 counts**
  - Many who test positive never return to care
  - Likely under-matching
- **In 2016, 3.35 million patients on ART (and VL monitored)**
  - Similar to NDOH estimates of 3.5 million TROA at the time

Results

Patients initiating ART in 2004-2006

- **N = 55,836**

6-year retention

- **…at initiating clinic:**
  - 29.1% (95% CI: 28.7 – 29.5)
- **…system-wide:**
  - 63.3% (95%CI: 62.9 – 63.7)

Population Characteristics at ART initiation		
Sex	Female	67%
Age Median (IQR)	36 (30-43)	
CD4 count Median (IQR)	150 (81-230)	

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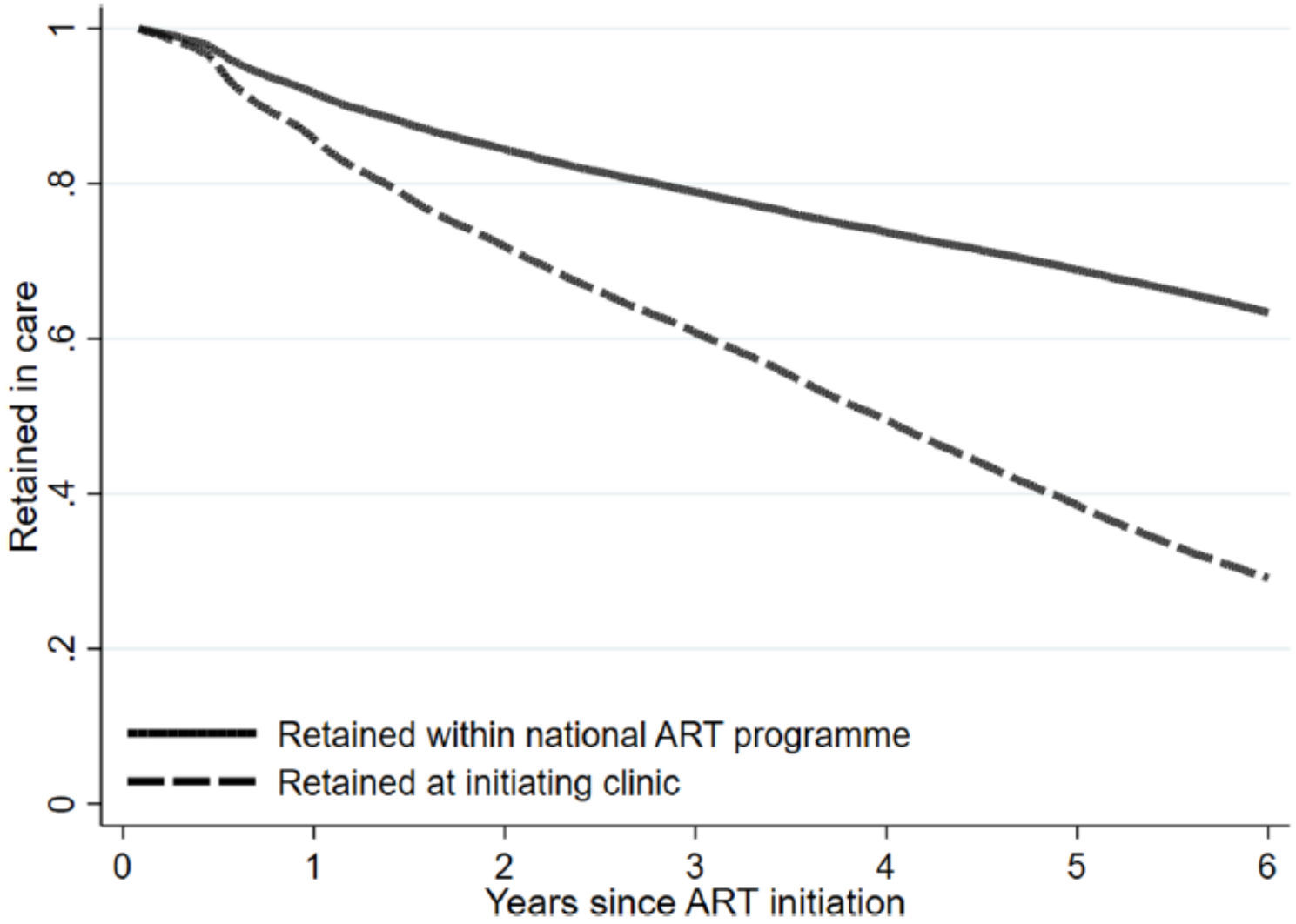
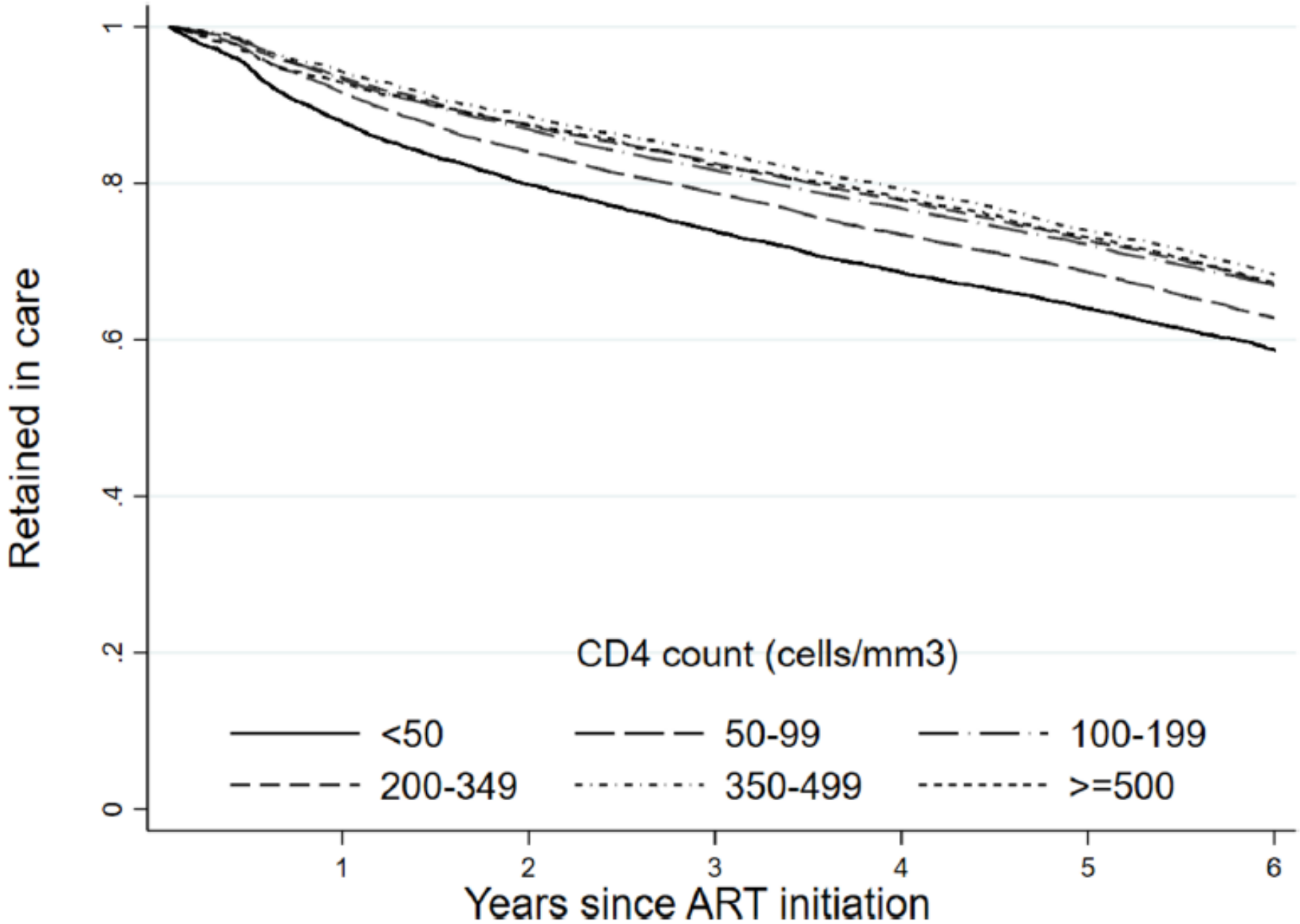
Retention: system-wide vs. clinic perspective

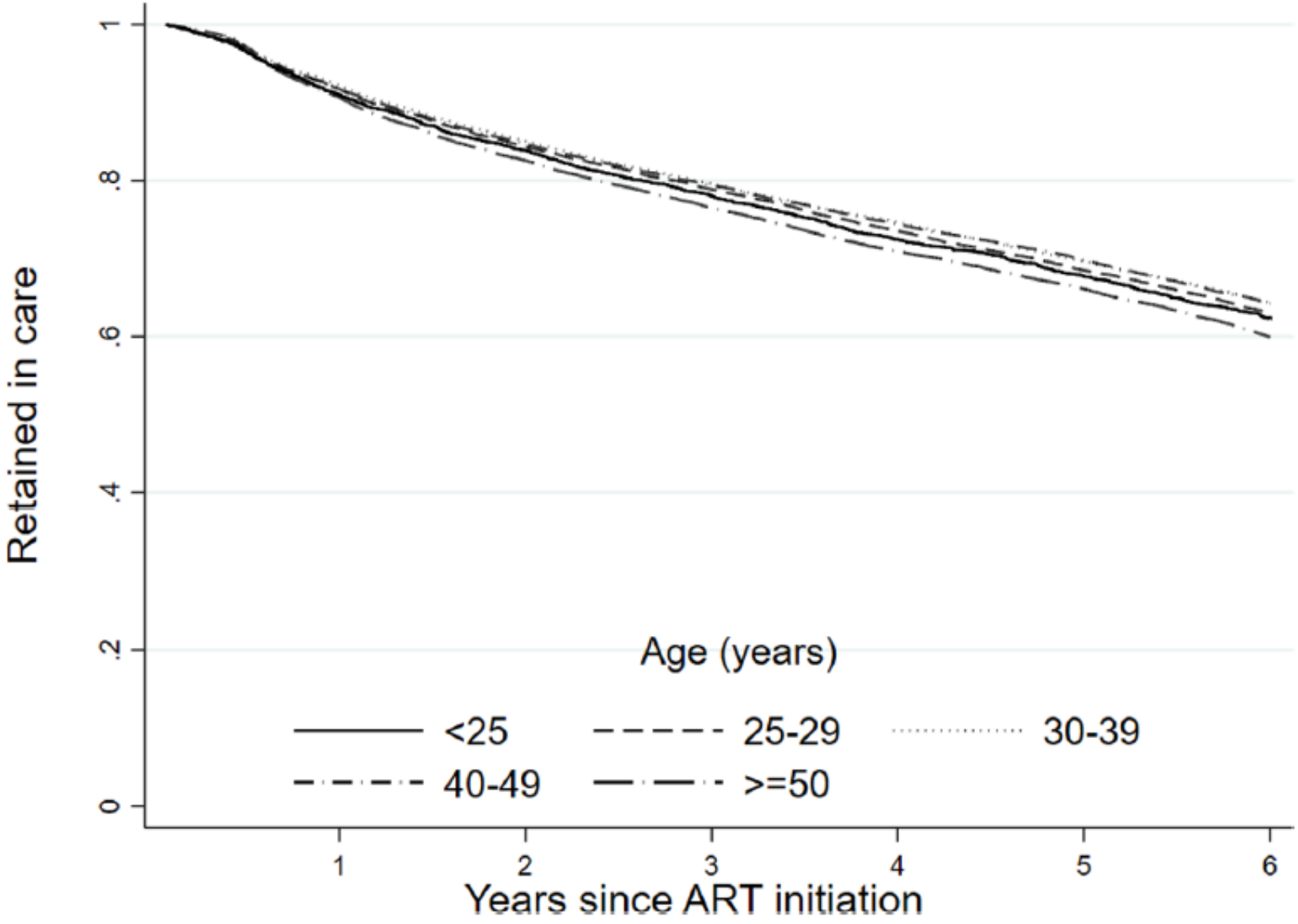


	1 year	3 year	6 year
System-wide	0.90 (0.89-0.91)	0.72 (0.71-0.72)	0.53 (0.52-0.53)
Clinic retention	0.86 (0.85-0.86)	0.61 (0.60-0.61)	0.29 (0.28-0.29)

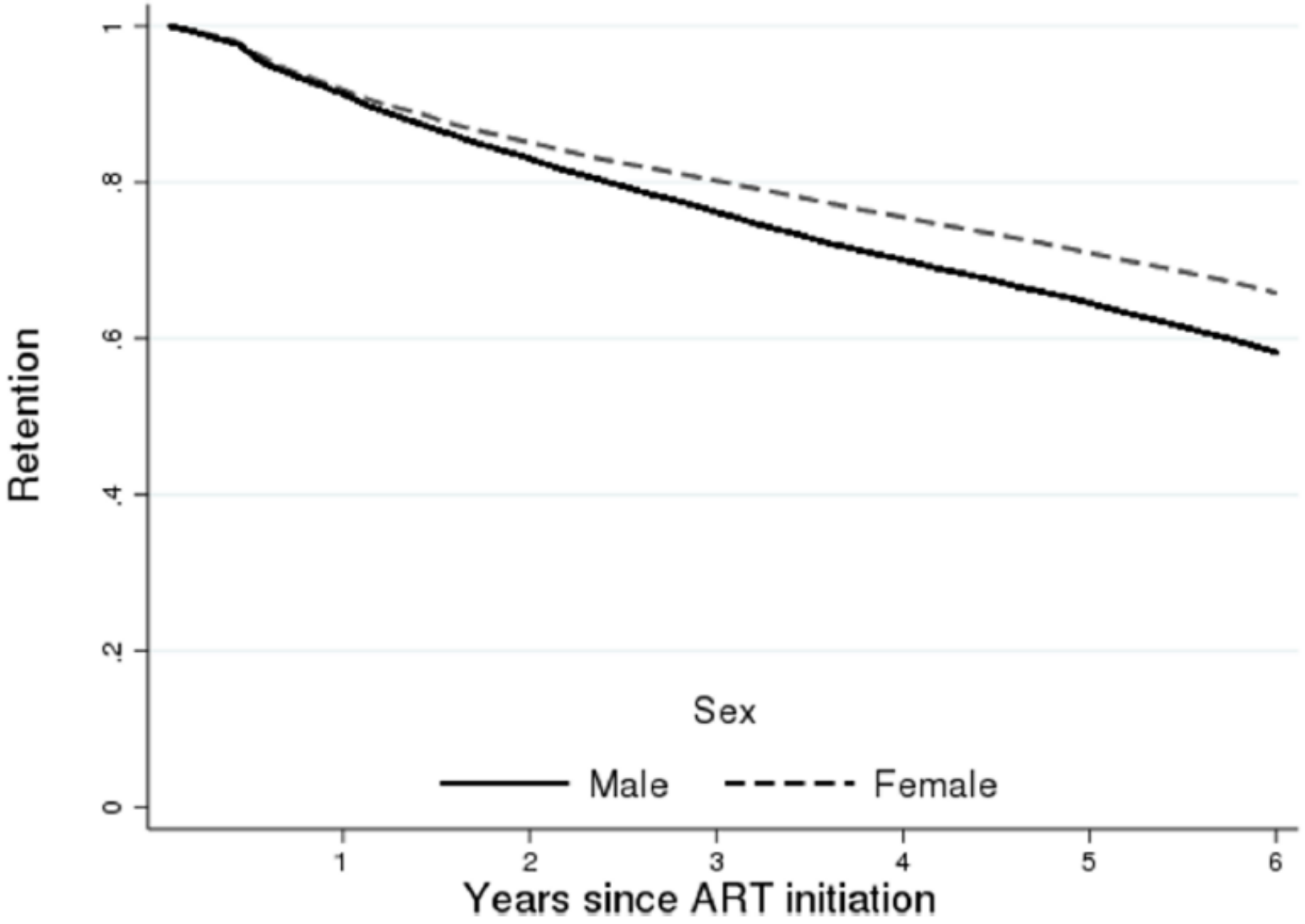
System-wide retention, by first CD4 count



System-wide retention, by age



System-wide retention by sex



Adjusted predictors of attrition*

Factor		System-wide attrition HR (95% CI)
CD4 count	<50	1.25 (1.19 - 1.31)
(cells/µl)	50-99	1.10 (1.06 - 1.16)
	100-199	Reference
	200-349	1.04 (0.99 - 1.08)
	350-499	0.99 (0.93 - 1.06)
	≥500	1.01 (0.93 - 1.10)
Age (years)	<25	1.10 (1.02 - 1.19)
	25-29.9	1.02 (0.97 - 1.08)
	30-39.9	0.91 (0.87 - 0.96)
	40-49.9	0.90 (0.85 - 0.94)
	≥50	Reference
Sex	Female	Reference
	Male	1.29 (1.25 - 1.33)

*Also adjusted for province, clinic size and viral load at ART initiation

Adjusted predictors of attrition*

Factor		System-wide attrition HR (95% CI)
Province	Gauteng	Reference
	Eastern Cape	0.93 (0.90 - 0.97)
	Free State	0.88 (0.82 - 0.95)
	Limpopo	1.28 (1.20 - 1.36)
	Mpumalanga	1.32 (1.24 - 1.41)
	Northern Cape	0.97 (0.89 - 1.06)
	North West	0.95 (0.90 - 0.99)
	Western Cape	0.66 (0.62 - 0.70)
Clinic size	1-43 patients	Reference
(quintiles)	44-112 patients	0.98 (0.93 - 1.03)
	113-231 patients	1.14 (1.08 - 1.20)
	232-431 patients	1.16 (1.11 - 1.22)
	432-1071 patients	1.25 (1.19 - 1.31)

Conclusions

- **Strengths:**
  - Size, national scope, ability to see movement between clinics
- **Limitations:**
  - Limited data on predictors, over/under matching, no mortality data, doesn't include patients who never return
- **Patient migration and transfer are common throughout South Africa**
  - NHLS National Patient Cohort allows passive tracking of patients regardless of where they seek care
- **Overall retention in care is underestimated using only the clinic wide perspective**

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